Inquiry and Investigation
Lesson Plan

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Course Name:
7th Grade Integrated
"How Many Traits Are There?"

Core Curriculum Standard Fulfilled: Standard IV: Students will understand that offspring inherit traits that make them more or less suitable to survive in the environment.

Core Curriculum Objective Fulfilled: Objective 1: Compare how sexual and asexual reproduction passes genetic information from parent to offspring.

Intended Learning Outcomes (ILO) fulfilled:

1e: When given a problem, plan and conduct experiments in which they: Identify variables; Collect data on the dependent variables; select appropriate format to summarize data obtained; analyze data and construct reasonable conclusions.
3a: Know and explain science information specified for their grade level.
4a: Provide relevant data to support inference and conclusions.

Time Needed to Complete Inquiry:

Approximately two, 45 minute class periods.

Inquiry: What is the research question to be scientifically investigated and how will your students actively participate? How will you use Guided Inquiry, Semi-guided Inquiry, or Open Inquiry as your teaching method? Students will investigate the occurrence and frequency of genetic traits and try to determine whether a characteristic is dominant or recessive.

Guided Inquiry will most likely be used, since some guidance will be necessary.

Assessment: How will you know that your students have met the objectives? Are there application extensions to this activity, interpretative test items, etc?

Understanding and successfully competing genetic wheel. First determine your characteristic for each trait (ear lobes; either free or attached). Then decide if your trait is dominant or recessive. If you think your characteristic is dominant, use the capital letter with the underscore. If you think your characteristic is recessive, use the double lower case letters. Color in the combination you selected. You will continue to work on the same half of the wheel working outward. If your first selection is L_ and your second choice is tt, then you will color in the L_ and then the tt above and connected to the L_.

Continue this process until you reach a number on the outer edge of the wheel. Discuss how many students have the same or different numbers.
Prior Knowledge Needed: What background and skills do the students need to be prepared for this inquiry? How will they obtain it?

Prior classroom discussions will have given students the terminology required for the activity (genes, traits, dominate, recessive, etc). They will also have learned and practiced graphs previously.

Introduction: Tell how you will introduce the inquiry to your students to make it meaningful and relevant.

Discuss needed terminology: dominate trait and recessive traits etc., and how they are expressed as a phenotype. Go through the seven traits below:

1) earlobes – attached or free
2) hair type – straight or curly
3) tongue rolling – can roll or cannot roll
4) mid-digit hair on fingers – hair present or hair absent
5) eye color – hazel, green, dark or blue, gray
6) widow's peak – peak present or peak absent
7) freckles – freckles present or freckles absent

Materials/Resources Needed for the Investigation:

- genetic wheel sheet
- graph paper
- ruler
- colored pencils

Procedures of the Investigation: Describe the actual investigation. What will the students do? If applicable, identify the independent and dependent variables, the constants, and the repeated trials.

Tell the students that they are to collect data on five different traits that can be organized and developed into a data table. Students will decide how to present the table. Also, students must decide which traits they will investigate from the traits given in the introduction.

Data Collection: How will students collect and organize data (tabulation)?

Students will construct a table to collect data on the number of students exhibiting each characteristic of each trait.

Data Analysis:

Then have students decide upon which type of graph to use to show their results. Variables can also be discussed. Independent variables are the different traits. Dependent variables are the number of students with each characteristic.

Closure: How will you provide closure to the experience? How ill students effectively communicate what they have learned?

Each group will discuss how they developed their data table and how they decided upon the traits and graph they chose. Lastly, have students compare how the traits that they used are similar or different between themselves and their parents. Discuss gene frequency within small groups and how it may change when large numbers are evaluated. For example, blue eyes can only be present when a person has two recessive alleles for eye color, yet in some areas of northern Europe, most people have blue eyes. Many times it is the frequency of the gene in a population rather than its dominance or recessiveness which determines how many people show the trait Also, discuss how environment affects traits.

How Many Traits Are There?

Name: _____
Period: _____

Purpose of Activity:
Students will identify various genetic traits, collect data on each trait, compile a data table of the information collected, graph their results, and discuss the results.

Materials:
- graph paper
- colored pencils
- ruler
- genetic wheel sheet

Background Information:
Terminology: Dominate/recessive traits; genetics; heredity; independent/dependent variables.

Procedures:
1. Decide upon five traits your group/class can observe and track in the data table. Develop your data table and then enter the information (number of students with each trait.
2. Complete step 3 for all five traits selected.
3. Decide which graph type (bar, line, pie) you will use and graph the data you collected. Attach your graph to the back of this sheet.
4. Share your information with the rest of the class. Based on your results, which characteristic for each trait do you think is the dominant characteristic? Show this information on your data table

Data Table: (develop your own table)

GENETIC WHEEL
Personal Trails

Name: _____
Period: _____

Directions:

Step 1: Place an "X" in the blanks that apply to you.

1. Ear lobes	_____	free
	_____	attached
2. Hair type	_____	curly
	_____	straight
3. Tongue rolling	_____	can roll
	_____	cannot roll
4. Mid-digital hair on fingers	_____	hair present
	_____	hair absent
5. Eye color	_____	hazel, green or dark
	_____	blue or gray
6. Widow's peak	_____	peak present
	_____	peak absent
7. Freckles	_____	freckles present
	_____	freckles absent

Step 2: Fill in the appropriate sections on the Genetic Wheel. Note that there are 128 possible combinations of the seven traits listed above. Did anyone else in your group/class get the same number that you did?

Step 3: Which of your traits are dominant? Which are recessive?